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| EXAMINER |
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MERKLING, MATTHEW J

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| ART UNIT | PAPER NUMBER |
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1795

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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| Office Action Summary | Application No. 10/650,044 | Applicant(s) YAMASHITA ET AL. | |
| | Examiner MATTHEW J. MERKLING | Art Unit 1795 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 September 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-6 and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-6 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/8/09</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 5, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fairlie et al. (WO 00/69773) in view of Sircar et al. (US 6,103,143) and Aoyama (US 2001/0018139) and Gardner (GB 2268322 A) and Keefer (US 2002/0098394).

Regarding claims 5 and 8, Fairlie discloses a hydrogen supply unit comprising:

a reforming means for generating hydrogen gas by reforming a source gas (page 5 lines 31-35);

a first purifying means connected to the reforming means for purifying hydrogen gas reformed by the reforming means (page 5 lines 31-35);

a first storage means for storing and supplying the hydrogen gas reformed by said reforming means to a first fuel cell (page 20 lines 28-31);

a first supply line connecting the first purifying means to the first storage means and supplying the hydrogen gas from the reforming means to the first storage means (page 5 lines 21-31, where Fairlie discloses that the hydrogen produced can be fed to a number of different types of 'hydrogen fuel users', which includes a fuel cell or a storage container);

a pressurization means (page 2 lines 22-29), provided in the first supply line between the first purifying means and the first storage means, for pressurizing the hydrogen gas to be stored by the first storage means.

While Fairlie does not explicitly disclose a 'second storage means' which feeds a second fuel cell, with a second supply line, such a modification is nothing more than a duplication of parts. Providing a second storage means, second fuel cell, second purifying means, and a second supply line would amount to a mere duplication of parts. Fairlie does disclose multiple users that receive hydrogen from the single hydrogen generating source. It has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

Furthermore, Fairlie discloses multiple users that utilize the same hydrogen source (for example, see Fig. 1). Fairlie discloses multiple uses for the hydrogen, such as a stationary generator as well as to power a vehicle (as mentioned above). Fairlie, however does not teach a second purifying means located in the second supply line.

However, it is well known in the art that different users of a hydrogen source often require different purities (see Sircar col. 8 line 67 – col. 9 line 2). As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add another purification means (duplicate) in the second supply line to supply a second user with a different purity hydrogen than that which is supplied to a first user.

Furthermore, it is also noted that although Fairlie does not explicitly disclose the exact layout of the purifying means, the pressurizing means, the storage means (more

specifically, Fairlie does not teach a second supply line branched from the first supply line between the first purifying means and the first storage means, supplying the hydrogen gas from the first purifying means to a second purifying means), such modifications are nothing more than a rearrangement of known apparatuses (purifiers, storage means, pressurizing means, etc.). As mentioned above, each hydrogen user may require a different purity and a different pressure of hydrogen. As such, the location of the purifiers, the storage means, the pressurizing means, and the supply lines are obvious engineering choices by one of ordinary skill in the art at the time of the invention.

Furthermore, while Fairlie teaches a hydrogen purification apparatus (as discussed above), Fairlie does not explicitly disclose that the purification apparatus is a hydrogen separation membrane.

Aoyama also discloses a system in which hydrogen is produced via a reforming reaction and then purified for an end user (see abstract).

Aoyama teaches a purification system (separation unit 20) that comprises a hydrogen separation membrane (20, see abstract) as a preferable technique to efficiently remove impurities from a reformed gas stream and produce a purified hydrogen gas stream that is suitable for applications such as a fuel cell (paragraph 19).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the hydrogen separation membrane of Aoyama to the hydrogen supply unit of modified Fairlie in order to purify hydrogen to a level where it is suitable for an end user, such as a fuel cell.

In addition, Fairlie discloses a hydrogen storage element (as discussed above), but does not explicitly disclose that the storage element comprises a hydrogen absorbing alloy.

Gardner also discloses a system in which hydrogen is generated via a reforming reaction and fed to an end user (in this case, a fuel cell, see abstract).

Gardner teaches a hydrogen storage apparatus that comprises a hydrogen storage alloy that is used to store generated hydrogen until the hydrogen is ready for use (such as during startup and during periods of high demand, see page 2 final paragraph and page 3 first paragraph).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the hydrogen absorbing material of Gardner to the hydrogen storage apparatus of modified Fairlie in order to provide a means to store the purified hydrogen where it can be used during periods of high demand or during startup when the reformer is not yet operating. In addition, such a modification would inherently provide a further purifying means for the hydrogen prior to introduction into the fuel cell (as impurities will not be absorbed by the hydrogen absorbing alloy).

Regarding limitations recited in claims 5 and 8 which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states “Expressions relating the

apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

In addition, Fairlie does not explicitly disclose that the second purifying means comprises a pressure swing absorber.

Keefer also discloses a process in which hydrogen is generated via a reforming reaction and then purified for use in a fuel cell (see abstract).

Keefer teaches utilizing a pressure swing adsorber in order to remove impurities from the generated hydrogen gas stream for use in a fuel cell. Such a purifier is an effective way of removing impurities from a hydrogen gas stream (see abstract).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the pressure swing adsorber of Keefer to the second purifying means of modified Fairlie in order to further purify the hydrogen gas stream for a second user. Such a modification is nothing more than applying a known technique to a known device to obtain predictable results.

Regarding claim 6, Fairlie further discloses a control system that measures amount of available energy (hydrogen) and operates the hydrogen production means (reformer) based on the amount of hydrogen remaining and demand of the users (see page 20 lines 3-20).

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fairlie et al. (WO 00/69773) in view of Sircar et al. (US 6,103,143) and Aoyama (US 2001/0018139) and Gardner

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(GB 2268322 A) and Keefer (US 2002/0098394) as applied to claim 8 above, and further in view of Ogino (JP 10-139401).

Regarding claims 3 and 4, while Fairlie discloses a hydrogen storage means that comprises a hydrogen storage alloy and stores hydrogen supplied from a reformer, Fairlie fails to teach:

- said storage means releases the hydrogen gas from a hydrogen absorbing alloy by use of waste heat of said reforming means or waste heat of said fuel cell,

Ogino also discloses a hydrogen storage means comprising a hydrogen storage alloy that stores hydrogen supplied from a reformer.

Ogino teaches a preferable storage means that stores hydrogen by use of a hydrogen absorbing alloy and subsequently releases said hydrogen from the alloy by heat exchange from waste heat from the fuel cell (paragraph 108).

As such, it would have been obvious to one of ordinary skill in the art to utilize the absorbing alloy and hydrogen releasing method of Ogino, in the hydrogen supply unit of Fairlie, in order to preferably store and remove hydrogen in said storage tank.

Response to Arguments

4. Applicant's arguments filed 9/11/09 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./

Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795